

### **[REU-3] ROADSIDE VEGETATION MANAGEMENT ACTIVITIES**

#### **INTEGRATED ROADSIDE VEGETATION MANAGEMENT**

Integrated Roadside Vegetation Management (IRVM) is a decision-making and quality management process for maintaining roadside vegetation that integrates the following:

- needs of local communities and highway users
- knowledge of plant ecology processes
- design, construction, and maintenance considerations
- monitoring and evaluation procedures
- government statutes and regulations
- technology

...with cultural, biological, mechanical, and chemical pest control methods to economically manage roadsides for safety plus environmental and visual quality.

IVRM is a spin-off of the Integrated Pest Management (IPM) concept used in agriculture, horticulture, and forestry. Integrated Pest Management (IPM) is a term used to describe a system of managing pests whereby all possible methods of reducing pests are combined (integrated) to maintain (manage) pest levels below economically damaging levels. IPM employs proven practical and least costly methods in a plan designed to exclude pests from the management unit.

The major components of an IPM program are:

- Plant Selection and Management  
Roadside vegetation managers should select plant species and cultivars that are well adapted to the landscape sites and exhibit genetic resistance to insects and diseases common to the area.
- Plant and Pest Monitoring  
An effective IPM program depends upon regular surveys of managed areas to determine which pests are present and to monitor their population(s). Roadside managers can use this information to judge whether the pest population is or will become large enough to cause unacceptable damage or negative aesthetic impact.
- Cultural Techniques  
Proper cultural methods are an important part of pest management. Emphasis should be placed on maintenance programs for turf and ornamental plantings to insure the correct performance of mowing, fertilization, irrigation, pruning and other cultural practices.
- Pest Biology and Ecology  
Methods of pest control are often developed through understanding how a pest interacts with its environment, then creating ways to deny the pest what it needs to survive.
- Determining When Pests Need to be Controlled  
Monitoring of turf and plantings is extremely important to determine when pests reach intolerable levels.
- Using Pesticides as Needed  
The use of herbicides is not an automatic response to sighting a pest, but rather a "step down" procedure of evaluating all methods of control to maintain public safety and

aesthetics. When herbicides are the chosen method of control, products are selected based on least environmental impact and then applied in a safe manner according to label directions.

- Pest Management Program Reevaluation  
An IPM program must be carefully analyzed after an appropriate amount of time has passed and changed if needed.
- Education of Pest Manager  
IPM managers should take advantage of opportunities to upgrade their knowledge of pests, pesticides, monitoring systems, plants and many other subjects. Knowledge of a wide range of subjects strengthens the managers ability to plan for, and react to, various pest problems.

North Carolina has the nation's largest State-Maintained Highway System consisting of 78,000 miles of highways. This equates to over 331,000 acres of rights of way maintained in three general forms: turf, natural areas, and landscape plantings. More acreage is brought into landscape plantings and natural areas each year through plant projects and reforestation programs. With the rising costs of installation and maintenance of these areas, it is important that we properly handle, install and maintain plant materials to protect our investment in our highways and our environment.

The highway roadside environment is typically harsh, making it difficult to establish landscape plantings. The soils encountered are usually subsoils that are low in plant nutrients and organic matter. Soil compaction is a major problem, limiting water retention and severely hindering plant root growth. In addition, highway landscape plantings usually must rely on rainfall as the only long-term source of irrigation. Due to these factors, our plant materials must be carefully selected and properly handled to provide the best opportunity for their survival.

Integrated Pest Management (IPM) and, more specifically, Integrated Roadside Vegetation Management (IRVM) are used to manage vegetation by simply applying logical information, communication, technology, planning and research. An effective IRVM program improves safety for the public and employees, satisfies long-range economic goals, maintains or improves quality, provides aesthetically pleasing facilities, and improves public relations.

North Carolina Roadside Vegetation Managers have endorsed and will continue to implement an Integrated Pest Management (IPM) program for the roadside acreage in North Carolina. The highest priority for NCDOT employees is supplying safe transportation corridors with hazard-free safety clear zones, low growing vegetation in the operational zone and open sight distances.

## VEGETATION MANAGEMENT PROGRAMS

An effective Integrated Roadside Vegetation Management (IRVM) program requires the Vegetation Manager to be knowledgeable about turfgrass, ornamental plantings, brush control and noxious and invasive weeds. During the pest control evaluation phase, herbicides may be the only realistic and cost effective control method available. The use of herbicides is not an automatic response to sighting a pest, but rather the result of a "step down" procedure of evaluating all methods of control to maintain public safety and aesthetics. When herbicides are

the chosen method of control, general use materials are selected based on least environmental impact and general use materials. Herbicides are then applied in a safe manner according to label directions when the pest is in a controllable stage.

Decisions to utilize herbicides are made after cultural or biological control methods have been evaluated. Short term and long term pest impacts are also considered and the cost of application and economic benefits are evaluated in the decision making process. With proper planning, herbicides can be used to reduce the frequency of mowing cycles and ultimately reduce the annual maintenance cost for interstate and primary routes.

The following sections describe how herbicides can be important and necessary tools in an IRVM Program.

#### Turf Management

- A. All of the turf treatments can reduce mowing and mowing costs; however, the **Plant Growth Regulator (PGR)** Program reduces one to two mowing cycles per year. The growth regulator program may be utilized to control the growth of cool season grasses such as fescue. A growth retardant typically interferes with cell division and thus prevents seedhead development. A plant growth regulator program can be an alternative to mechanical mowing, especially to reduce early season mowing cycles. Proper seasonal timing of application is critical for success.
- B. The **Warm Season Release (WSR)** Program controls undesirable grass and weed species while releasing or maintaining warm season turfgrasses such as bahiagrass, bermudagrass and centipedegrass. Pre-emergence and post-emergence herbicide treatments may be utilized in late winter or early spring to prevent growth of weeds and reduce early season sight distance problems and mowing cycles.
- C. A **Seedhead Control Program for warm season turfgrasses** may also be utilized. Like the PGR program, this seedhead control program may reduce one to two mowing cycles per year in turfgrass areas that are being managed as warm season species, especially for Pensacola Bahiagrass. Such a control program has been shown to be an acceptable alternative to mechanical mowing, especially to reduce mowing cycles during the early "green-up" stage of the warm season turfgrass-growing season. Proper seasonal timing of application is critical for success, however this type of seedhead control may be applied at various warm season turfgrass developmental stages.
- D. The **Broadleaf Weed Control** Program consists of controlling weed species along the roadsides while they are small and actively growing. Broadleaf weeds can present a major sight distance problem if not addressed properly. The presence of broadleaf weeds in roadside turfgrass can be aesthetically undesirable, and may also prevent the desired turfgrass from becoming readily established. The Department may utilize pre-emergence or post-emergence herbicides which effectively control broadleaf weeds.
- E. The **Annual Grass Control** Program may utilize herbicide treatments during the summer to control annual and perennial grasses such as crabgrass, dallisgrass, broomsedge, goosegrass, and others. Annual grass control is crucial in any vegetation management program because undesirable annual and perennial grasses compete for plant nutrients during the summer months, thinning stands of desirable turf. In many cases, especially in warm season grass areas, control of undesirable annual grasses may negate or delay the

need for mechanical mowing because the desirable turfgrass may not be of sufficient height to warrant the cost of a mowing cycle.

#### Woody Vegetation Management

- A. Mechanical mowing remains as the most frequently used method to control woody brush on rights of way. Mowing with a sequential **Foliar Brush Control** application has proven the most efficient and cost effective approach for controlling brush. The preferred process recommends mowing smaller brush late in the growing season or in winter followed by a herbicide treatment the following year after the plants resprout and begin to "sucker" at the cut locations. This process will control the root system and generally reduce the mowing requirements for several years. This sequence should be closely followed to avoid the need to cut or spray large brush.
- B. Over the past several years, the Department has utilized **Dormant Stem Treatments** during the winter months. This has allowed the Department to expand the window of opportunity to control brush, without causing "brown out" to the treated vegetation. This type of brush treatment has also allowed better utilization of available personnel and equipment during normally less productive winter months.
- C. Probably the most aggressive vegetative pest in the roadside environment is kudzu. This invasive vine not only affects the highway system, but also adjacent properties and landowners. The **Kudzu Control** Program may consist of a cooperative eradication agreement between the Department and the adjacent landowner(s), in which each party agrees to control the undesirable vegetation on their respective property. The Department also targets suppression of kudzu growth in and around highway signs, bridges, guardrails, and other essential structures.
- D. The Department maintains thousands of miles of controlled-access highway routes which are bordered by fences. A **Fence Treatment** Program targets control of undesirable vegetation growing along these fence lines. In most cases, this is woody vegetation, such as various types of vine growth and/or small tree saplings. A fence treatment herbicide program is often used in conjunction with manual vegetation removal by inmate labor.
- E. A lesser-utilized, but promising woody vegetation control method is referred to as a **Stump Treatment** Program. This method is utilized where hardwood brush/trees are mechanically cut back, normally to ground level, and a systemic herbicide solution is applied directly to the cut surface. The objective of this treatment is to prevent the cut surface from regenerating new hardwood sprouts.

#### Weed/Grass Control Around Stationary Objects

Stationary objects such as **guardrails and sign posts** must remain clear of unsightly vegetation in order to serve their purpose. Pre-emergence and post-emergence herbicide treatments may be utilized to prevent weeds and brush from growing around these structures. When planning such a program, care should be taken to select herbicide materials that will not cause complete bare-ground conditions which could lead to erosion control problems. This planning is especially needed in areas of increased drainage. The Department is currently encouraging the establishment of low growing turf such as centipede under guardrails, to reduce erosion and weed growth. Centipede's allelopathic effect should reduce the need for future herbicide applications.

### Weed Control in Ornamental Landscape Plantings

Good cultural practices such as mulching can significantly reduce unwanted weed growth and conserve moisture in formal roadside ornamental plantings. Experience has shown that weed management in these plantings is not practical without the use of herbicides. **Pre-emergence herbicide applications** may be made in the fall for control of winter weeds and grasses and during the spring to control summer weeds and grasses. **Post-emergence herbicide applications** may be applied throughout the year to control undesirable vegetation that has emerged during the growing season.

### Weed Control in Wildflower Plantings

- A. The most widely-used initial weed control treatment for wildflower sites is **soil fumigation**. This procedure involves complete rototilling of the top 4"-6" of the soil surface to provide optimum soil tilth. The site is then sub-soil injected with approved pesticides to control weed seeds, as well as soil-borne diseases and parasites. Some soil fumigants require a plastic covering of the soil upon injection of the fumigant, as well as complete burial and sealing of the edges of the plastic covers. Other types of soil fumigants are also available which do not require a plastic covering, but instead utilize the rotovate-and-roll technology.
- B. An alternative to fumigating the soil in wildflower beds is to use **pre-plant soil incorporation** herbicides to remove weeds and unwanted grasses from the plant bed areas. There are three steps in an effective pre-plant soil incorporation weed control program.
  - Step 1:** Apply a post-emergence herbicide to control mature weeds and grasses to the site;
  - Step 2:** Allow approximately seven days for the herbicide to effectively control weeds. After seven days, the soil should be thoroughly tilled to a depth of 4"-6", as previously mentioned;
  - Step 3:** After the site is leveled to the proper elevation, a pre-emergent herbicide is applied to the site and incorporated into the soil with appropriate tillage equipment. For sites with relatively low populations of existing vegetation, it may be practical to delete Step 1) above, as well as require less tillage than described in 2) above. Care should be taken to make sure that the wildflower species to be planted in these sites are tolerant of the herbicides incorporated. Technical scientific data should be consulted for this information.
- C. One of the most challenging aspects of establishing perennial roadside wildflowers is satisfactory control of weeds within the sites. In recent years, much research has been conducted to determine what herbicide materials can be used in a **Wildflower Pre-emergence Weed/Grass Control** Program. The objective of this program is to adequately control competing weed/grass growth, while not damaging the desired wildflower species in an "over-the-top" broadcast application. A few herbicide materials have been determined to be successful in this program, and research is continuing.
- D. Another important aspect of established roadside wildflower site maintenance is an effective **Wildflower Post-emergence Weed/Grass Control** Program. Even with the best management practices previously mentioned, there will usually be "escapes" of some types of weeds and/or grasses that would present competition problems in wildflower sites along the roadside. In these cases, the last "line of defense" may be a post-

emergence treatment. This type of herbicide treatment is also applied "over-the-top" of established wildflowers, without damaging the wildflowers. They may be used only if technical data and research supports their use without damaging the wildflowers. Another method of post-emergence control is ropewicking. These materials only come in contact with undesired vegetation growing at a height above the existing wildflower species.

#### Weed/Grass Control Along Paved Shoulders

- A. Asphalt and concrete roadway surfaces often have weed growth which can deteriorate pavement rapidly. **Pre-emergence weed/grass control beneath pavement** is often used to prevent the initial growth of undesirable vegetation upward through a new pavement. In this type of application a non-selective soil sterilant herbicide material is applied to the base soil surface prior to the asphalt paving process. The objective is for the herbicide to act as a "barrier" to prevent the vegetative growth. In most cases the herbicide material must be applied immediately prior to the laying of the asphalt material, in order to avoid potential off-target damage via run-off.
- B. If undesired vegetation has already grown through or upon the paved surfaces, the only practical alternative is **post-emergence control**. Various non-selective herbicides can be used for this application, but care should be taken to choose stable materials that will not cause undesired residual effects, such as damage from drainage run-off.

#### Weed/Grass Control on Capped Traffic Islands

The concepts and herbicide materials for **vegetation control on capped traffic islands** is basically the same as for paved shoulders, as described above. Limited work has been done to include appropriate non-selective herbicides mixed with liquid asphalt in crack-sealing operations on capped traffic islands, as a vegetation control method. The user of this method must ensure that the herbicide material is compatible with the liquid asphalt.

#### Noxious Weeds

A common term for some types of vegetation is "**noxious weeds**", which can be any plant in any stage of development, including parasitic plants, whose presence, whether direct or indirect, is detrimental to crops or other desirable plants, livestock, land, or other property, or is injurious to the public health. The North Carolina Department of Agriculture and Consumer Services (NCDA & CS) maintains a list of weeds considered "noxious". The current list includes these:

Blessed Thistle	Cornflower (Ragged Robin)
Cocklebur	Texas Panicum
Spurred Anoda	Bracted Plantain
Velvetleaf	Buckhorn Plantain
Corn Cockle	Curly Dock
Wild Radish	Dodder
Purple Nutsedge	Giant Foxtail
Yellow Nutsedge	Horsenettle
Canada Thistle	Quackgrass
Field Bindweed	Wild Mustard
Hedge Bindweed	

Many of the above-listed "noxious" weeds are found on North Carolina roadsides.

### Pestiferous Weeds

Another term commonly used for undesirable vegetation is **pestiferous weeds**, which can be any plant regardless of its stage of development and irregardless of its status on NCDA & CS's noxious weeds list, that persists in the rights of way and is so considered to be annoying, bothersome, or unsightly. The roadside environment often includes pestiferous weeds that are of particular concern to both public right of way interests as well as adjacent private landowners. In general, the predominate herbicide applications for control of these weeds would be of the selective post-emergence type. As mentioned previously for kudzu, the NCDOT may participate in a cooperative eradication program with adjacent property owners, whereby each party must control the undesirable vegetation on their respective property. This program has proven to be successful in reducing the competition of problem species.

### Aquatic Weeds

Aquatic weeds such as alligator weed and purple loosestrife, may be controlled along canals and wet ditches to facilitate drainage. For this purpose, the NCDOT selects only herbicides that are properly labeled for aquatic use. Personnel involved in application of properly labeled herbicides along waterways should be licensed by NCDA & CS for aquatic pesticide applications.